

REMARKS

Claims 72-79 and 81-86 are pending in this application. Claim 81 has been amended. No new matter has been introduced. Applicant acknowledges with appreciation the allowance of claims 72-79.

Claims 81-84 stand rejected under 35 U.S.C. §102(b) as being anticipated by Moore et al. (U.S. Patent No. 5,689,275) ("Moore"). This rejection is respectfully traversed.

The claimed invention relates to a solid material having spatial regions arranged in a periodic array. As such, amended independent claim 81 recites a "semiconductor material having regions arranged within said semiconductor material in a periodic array, said regions being completely surrounded by said semiconductor material and having different particle diffraction patterns than said semiconductor material without regions." Amended independent claim 81 also recites that the regions comprise "a solid material different from the material of said semiconductor material."

Moore relates to a "photonic bandgap antenna (PBA) (10') that "utilizes a periodic bandgap material (PBM), which is essentially a dielectric, to transmit, receive, or communicate electromagnetic radiation encoded with information." (Abstract). According to Moore, "a photonic bandgap transmission line (PBTL) (10'') can also be constructed with the PBM." (Abstract). In this manner, "[b]ecause the PBA (10') and PBTL (10'') do not utilize metal, the PBA (10') and PBTL (10'') can be used in harsh environments, such as those characterized by high temperature and/or high pressure, and can be easily built into a dielectric structure such as a building wall or roof." (Abstract).

Moore fails to anticipate the subject matter of claims 81-84. Moore does not disclose, teach or suggest a "semiconductor material having regions arranged . . . in a periodic array" and "being *completely* surrounded by said semiconductor material," as amended independent claim 81 recites (emphasis added). In Moore, the plurality of "parallel elongated cylindrical elements 22," which would arguably correspond to the "spatial regions" of the claimed invention, are not "completely surrounded by said semiconductor material," as in the claimed invention. As illustrated in Figure 3, for example, the "parallel elongated cylindrical elements 22" of Moore are surrounded by dielectric material 23 only on their sides and not on their top and bottom. Thus, elements 22 of Moore are not "completely surrounded by said semiconductor material," as in the claimed invention. For at least these reasons, the subject matter of claims 81-84 is not anticipated by Moore, and withdrawal of the rejection of these claims is respectfully requested.

Claims 85 and 86 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Moore in view of Fan et al. et al. (U.S. Patent No. 5,440,412) ("Fan"). This rejection is respectfully traversed.

Claims 85 and 86 depend on amended independent claim 81 and recite that the periodic array "includes at least one unit cell" (claim 85) and that the "unit cell is a body-centered cubic unit" (claim 86).

Fan relates to a "three-dimensional photonic bandgap" that "includes a plurality of layers, each layer having a stratum of a first material having a first dielectric constant and a plurality of parallel grooves along a first axis lying in the plane of the layer, the grooves including a second material having a second dielectric constant." (Abstract). Fan also teaches "a plurality of parallel channels formed through the plurality of layers in a second axis orthogonal to the plane of the layers, the channels

being adapted to comprise a third material having a third dielectric constant, thereby resulting in the structure having three-dimensional periodicity.” (Abstract).

The subject matter of claims 85 and 86 would not have been obvious over Moore in view of Fan. Specifically, the Office Action fails to establish a *prima facie* case of obviousness. Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

In the present case, Moore and Fan, whether considered alone or in combination, fail to disclose, teach or suggest all limitations of amended independent claim 81. As noted above, Moore does not teach or suggest a “semiconductor material having regions arranged . . . in a periodic array, said regions being *completely* surrounded by said semiconductor material,” as in the claimed invention. In Moore, the plurality of “parallel elongated cylindrical elements 22,” which would arguably correspond to the “spatial regions” of the claimed invention, extend from the top to the bottom of the dielectric material 23. Thus, cylindrical elements 22 of Moore cannot be “completely surrounded by said semiconductor material,” as in the claimed invention.

Similarly, Fan fails to disclose, teach or suggest all limitations of amended independent claim 81. Fan teaches a plurality of grooves etched within layers of semiconductor material and then filled with silicon oxide (SiO₂) to form grooves 26 with SiO₂. Fan also teaches parallel channels or holes 29 “etched into the top surface

and through the structure, at normal incidence, along the z-axis." (Col. 3, lines 16-18). However, as described and as clearly illustrated in Figure 1 of Fan, neither the grooves 26 with SiO₂ nor the parallel channels or holes 29 of Fan are "*completely* surrounded by said semiconductor material," as in the claimed invention (emphasis added). For at least these reasons, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 85 and 86 is also respectfully requested.

Allowance of all claims 72-79 and 81-86 is solicited.

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